

Windbreak Design

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This NebGuide provides general information for designing a tree and shrub windbreak. Landowners should work with a natural resource professional to develop site-specific tree planting plans.

What is the best design for a windbreak? The answer depends on the purpose of the windbreak, the benefits desired and the characteristics of the site where the windbreak will be located. The optimum windbreak will include enough trees to provide both wind and snow protection.

The typical multiple-row windbreak has several components: (1) dense conifer trees to reduce wind velocity; (2) tall broadleaf or conifer trees to extend the area of protection; (3) low shrubs to trip snow, provide wildlife habitat and/or provide aesthetic value. *Figure 1* illustrates a recommended multiple-row windbreak design.

Effectiveness of a windbreak is often expressed in terms of its density. Density is defined as the ratio of the solid area of the trees to the total area of the windbreak.

If the objective is protection from snow (e.g., a living snow fence), the windbreak should have a density of 70 - 80 percent. This can be achieved with multiple rows of dense conifer trees or closely spaced shrubs. If the objective is to spread snow across cropland using a field windbreak, the windbreak should have a density of 25 - 35 percent. One or two rows of mixed broadleaf or pine trees can provide this density. Most farmstead or livestock windbreaks should be

designed with a density of 40 - 60 percent, which can be achieved by planting multiple rows of conifer and broadleaf trees (see *Figure 1*).

Windbreak Location

The most effective protection is obtained by orienting windbreaks perpendicular to the prevailing wind of concern. Windbreaks designed for winter protection are generally located north and west of farmsteads, livestock concentration areas, working facilities or other areas to be protected. Although often overlooked, protection from northeasts storms should be considered when designing a windbreak.

Figure 2 depicts two alternative windbreak designs. A windbreak with two legs protects a greater area than a single leg windbreak. A common design error is not extending the windbreak beyond the area to be protected. This creates the problem of wind circling the end of the windbreak, increasing the windchill or snow deposition in the area being protected. In order to allow for snow deposition, the windward tree rows should be located approximately 150 - 250 feet upwind of the area to be protected. This will allow adequate space for snow deposition.

Field windbreaks designed to reduce soil erosion are generally single row windbreaks planted parallel to cropping patterns (north/south or east/west orientation). Windbreak designed for growing season crop protection should be located on the south and east side of fields. The area protected by windbreak is a function of the average height of the windbreak. Generally, a windbreak protects an area 10 - 15 times the average height ("H") of the trees. It may be better to use two single-row windbreaks spaced 15 times one height of the windbreak at maturity (15 "H"), than to use one double-row windbreak. These single-row windbreaks protect twice the cropped area, with the same amount of land in windbreaks.

